Ambient Weather WS-70 Wireless Indoor/Outdoor 8-Channel Thermo-Hygrometer with Jumbo Display User Manual

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1 Introduction

Thank you for your purchase of the Ambient Weather WS-70 Wireless Indoor/Outdoor 8-Channel Thermo-Hygrometer with Jumbo Display. The following user guide provides step by step instructions for installation, operation and troubleshooting. To download the latest manual and additional troubleshooting tips, please visit:

http://ambientweather.wikispaces.com/ws70

2 Getting Started

Note: The power up sequence must be performed in the order shown in this section (insert batteries in the remote transmitter(s) first, Display Console second).

The WS-70 weather station consists of a display console (receiver), and a thermo-hygrometer (remote transmitter).

2.1 Parts List

QTY	Item
1	Display Console Frame Dimensions (LxHxW): 4.50 x 5.0 x 1.00 in LCD Dimensions (LxW): 3.75 x 3.50” LCD Segment Height: 1.25 inches
1	Thermo-hygrometer transmitter (FT007TH) Dimensions (LxHxW): 4.5” x 2.0” x 0.75”

2.2 Recommend Tools

Hammer and nail for hanging remote thermo-hygrometer transmitter.

1.1 2.3 Thermo-Hygrometer Sensor Set Up

Note: Do not use rechargeable batteries. We recommend fresh alkaline batteries for outdoor temperature ranges between -4 °F and 140 °F and fresh lithium batteries for outdoor temperature ranges between -40 °F and 140 °F.

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1. Remove the battery door on the back of the sensor by removing the set screw, as shown in Figure 1 .

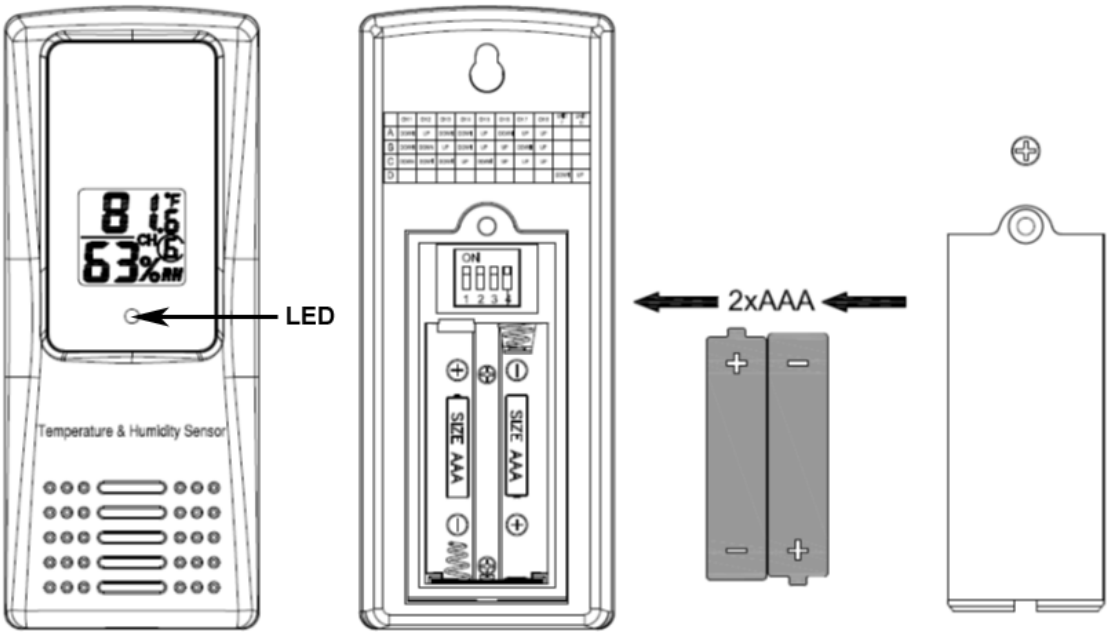

Figure 1

2. **BEFORE** inserting the batteries, locate the dip switches on the inside cover of the lid of the transmitter.
   Figure 2 displays all four switches in the OFF position (factory default setting).

Figure 2

3. **Channel Number:** The WS-70 supports up to eight transmitters. To set each channel number (the default is Channel 1), change Dip Switches 1, 2 and 3, as referenced in Table 1.
4. **Temperature Units of Measure:** To change the transmitter display units of measure (°F vs. °C), change Dip Switch 4, as referenced in Table 1.

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DIP SWITCH				FUNCTION
1	**2**	**3**	**4**	
DOWN	DOWN	DOWN	---	Channel 1
DOWN	DOWN	UP	---	Channel 2
DOWN	UP	DOWN	---	Channel 3
DOWN	UP	UP	---	Channel 4
UP	DOWN	DOWN	---	Channel 5
UP	DOWN	UP	---	Channel 6
UP	UP	DOWN	---	Channel 7
UP	UP	UP	---	Channel 8
---	---	---	DOWN	°F
---	---	---	UP	°C

Table 1

5. Insert two AAA batteries.
6. After inserting the batteries, the remote sensor LED indicator will light for 4 seconds, and then flash once per 60 seconds thereafter. Each time it flashes, the sensor is transmitting data.
7. Verify the correct channel number (CH) and temperature units of measure (°F vs. °C) are on the display, as shown in Figure 3.

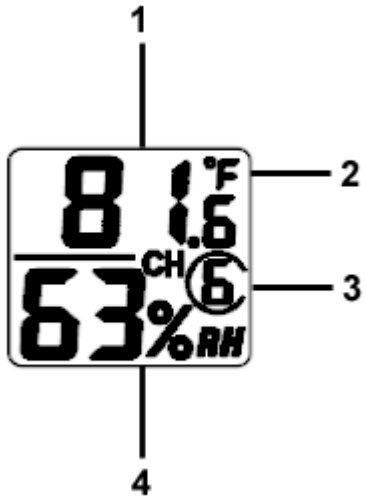

Figure 3

(1) temperature
(2) temperature units (°F vs. °C)
(3) channel number
(4) relative humidity

8. Close the battery door. Make sure the gasket (around the battery compartment) is properly seated in its trace prior to closing the door. Tighten the set screw.

2.3 Display Console Set Up

1. Move the remote thermo-hygrometer(s) about 5 to 10’ away from the display console (if the sensor is too close, it may not be received by the display console). If you have more than one thermo-hygrometer, make sure they are all powered up and transmitting on different channels.

2. Remove the battery door on the back of the display, as shown in Figure 4. Insert four AAA (alkaline or lithium, avoid rechargeable) batteries in the back of the display console.

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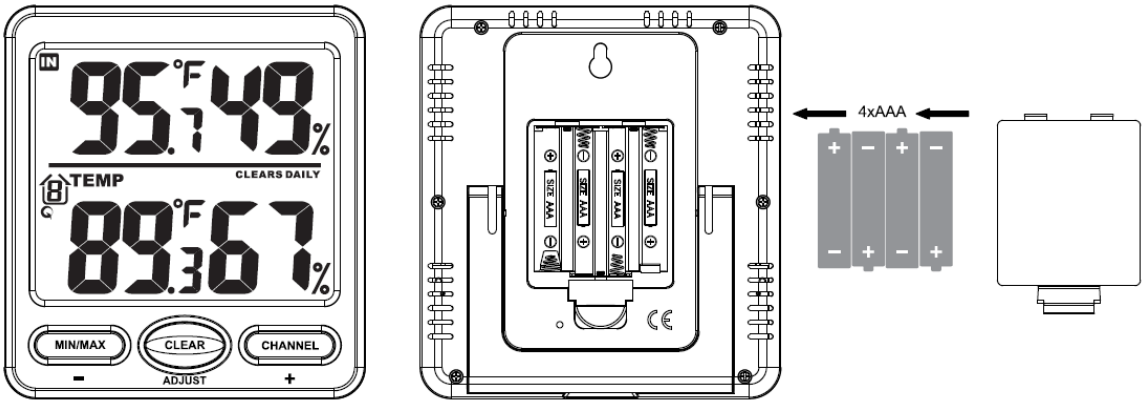

Figure 4

All of the LCD segments will light up for a few seconds to verify all segments are operating properly.

3. Replace the battery door, and fold out the desk stand and place the console in the upright position.

   The console will instantly display indoor temperature and humidity as designated by the IN icon. The remote temperature and humidity will update on the display within a few minutes on the appropriate channel.

   While in the search mode, the remote search icon will be constantly displayed.

   If you have more than once remote sensor (up to eight remotes are supported), the display will automatically toggle between sensors until all sensors have reported in.

   Do not touch any buttons until the remote sensor has reported in, or the radio search icon is no longer on, otherwise the remote sensor search mode will be terminated. When the remote sensor temperature and humidity has been received, the console will automatically switch to the normal mode, and all further settings can be performed.

If the remote does not update, please reference the troubleshooting guide in Section 7.

2.3.1 Display Console Layout

Note: The following illustration shows the full segments of the LCD for description purposes only and will not appear like this during normal operation.

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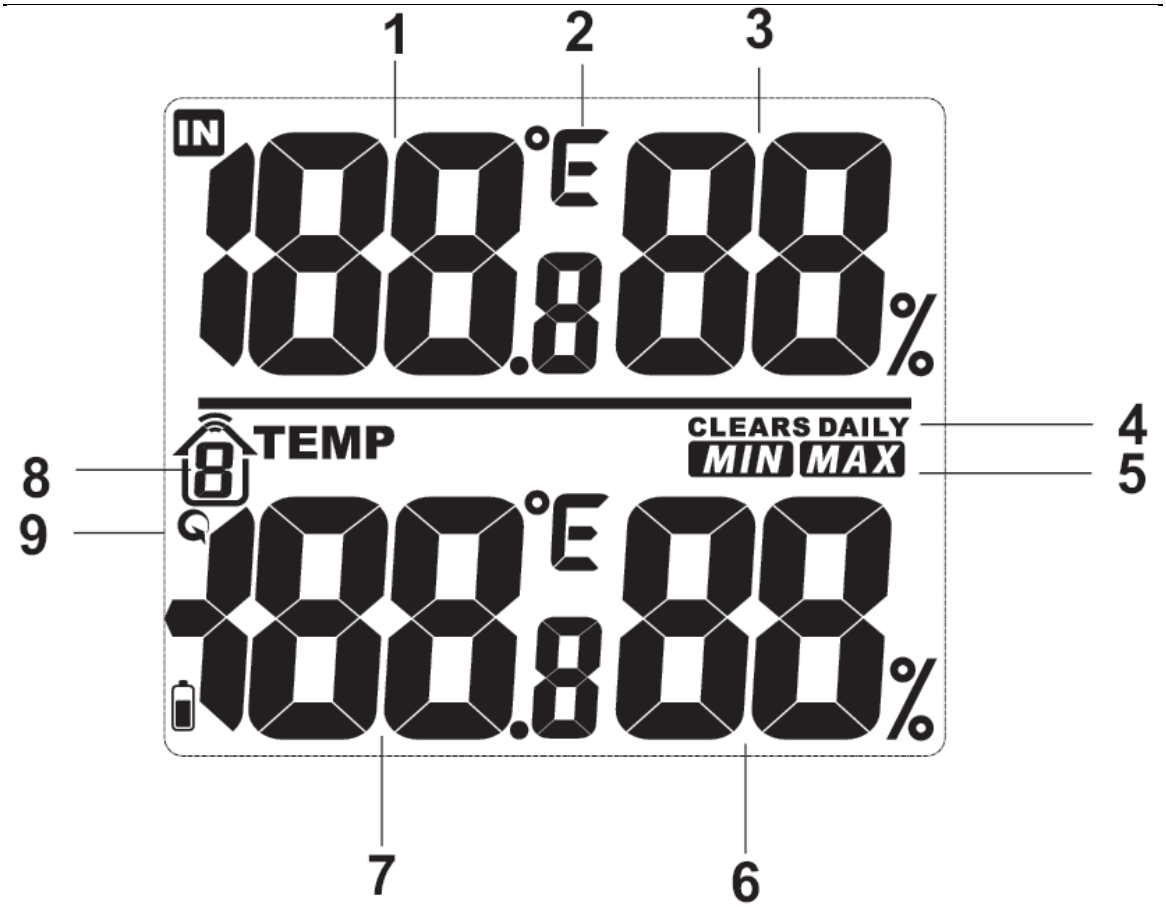

Figure 5

1. Indoor Temperature
2. Temperature units (°F or °C)
3. Indoor Relative Humidity (%)
4. Min/Max reset for 24h
5. Min/Max Record mode
6. Outdoor Relative Humidity (%)
7. Outdoor Temperature
8. Channel 1,2,3,4,5,6,7,8, indictor
9. Scroll mode (CH1-8)

2.3.2 Sensor Operation Verification

Verify the indoor and outdoor humidity match closely with the console and sensor array in the same location (about 5 to 10' apart). The sensors should be within 10% (the accuracy is ± 5%). Allow about 30 minutes for both sensors to stabilize. The humidity can be adjusted or calibrated later to match each other a known source.

Verify the indoor and outdoor temperature match closely with the console and sensor array in the same location (about 5 to 10' apart). The sensors should be within 2°F (the accuracy is ± 1°F). Allow about 30 minutes for both sensors to stabilize. The temperature can be adjusted or calibrated later to match each other or a known source.

3 Remote Sensor Installation

It is recommended you mount the remote sensor on a north facing wall, in a shaded area. Direct sunlight and radiant heat sources will result in inaccurate temperature readings. Although the sensor is water resistant, it is best to mount in a well protected area, such as under an eve. Use a screw or nail

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(not included) to affix the remote sensor to the wall, as shown in Figure 6.

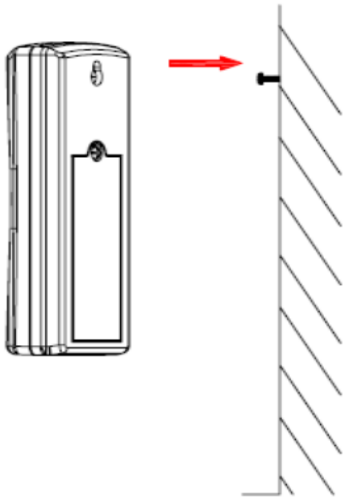

Figure 6

4 Console Operation

Note: The console has three buttons for easy operation: **MIN/MAX/-** button, **CLEAR/ADJUST** button, and **CHANNEL/+** button.

4.1 Min/Max Mode

The Min/Max mode displays the minimum and maximum temperature and humidity (since reset of the unit) for the indoor, remote channel 1 through 8 sensors.

Prior to entering the MIN/MAX mode, press the **CHANNEL/+** button to select the temperature and humidity values you wish to view.

1. **Display Maximum**. Press the **MIN/MAX** button once to display the maximum. The **MAX** icon will be displayed.
2. **Clear Maximum.** To reset the maximum values to the current values, *press and hold* the **CLEAR** button for 3 seconds.
3. **Display Minimum**. Press the **MIN/MAX** button again to display the minimum. The **MIN** icon will be displayed.
4. **Clear Minimum.** To reset the minimum values to the current values, *press and hold* the **CLEAR** button for 3 seconds.

To return to normal mode, press the **MIN/MAX** button again.

4.2 Clearing Min/Max Daily

The minimum and maximum can be set to clear every 24 hours automatically. Press and hold the **CLEAR/ADJUST** button for 5 seconds to switch between **Clears Daily** and **Clears Manually**.

When you manually clear the minimum and maximum, the Clears Daily function will clear every 24 hours from the time you clear it.

For example, if you clear the min and max at 4:00pm, it will continue to clear every day at 4:00pm.

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4.3 Outdoor Channel Selection

Press the **CHANNEL/+** button to switch the display between the remote sensors 1 through 8 temperature and humidity, and scroll mode . In scroll mode, all of the detected outdoor sensors will be displayed in five second intervals.

4.4 Temperature Units of Measure

The default temperature units of measure are degrees Fahrenheit. To toggle between degrees Celsius and degrees Fahrenheit, press and hold the **MIN/MAX** button for 3 seconds.

4.5 Sensor Search Mode

If any of the sensor communication is lost, dashes (--.-) will be displayed on the screen. To reacquire the signal:

1. If a specific channel is lost, press the **CHANNEL/+** button to display this channel, then Press and hold the **CHANNEL/+** button for 3 seconds, and the remote search icon will be constantly displayed for up to 10 minutes. Once the signal is reacquired, the remote search icon will turn off, and the current values will be displayed.
2. If new sensors are added, subtracted, or multiple sensor channels are lost, Press and hold the **CHANNEL/+** button for 5 seconds, and the remote search icon will be constantly displayed for up to 10 minutes. Once the signal is reacquired, the remote search icon will turn off, and the current values will be displayed.

4.6 Best Practices for Wireless Communication

Wireless communication is susceptible to interference, distance, walls and metal barriers. We recommend the following best practices for trouble free wireless communication.

1. **Electro-Magnetic Interference (EMI)**. Keep the console several feet away from computer monitors and TVs.
2. **Radio Frequency Interference (RFI).** If you have other 433 MHz devices and communication is intermittent, try turning off these other devices for troubleshooting purposes. You may need to relocate the transmitters or receivers to avoid intermittent communication.
3. **Line of Sight Rating.** This device is rated at 300 feet line of sight (no interference, barriers or walls) but typically you will get 100 feet maximum under most real-world installations, which include passing through barriers or walls.
4. **Metal Barriers.** Radio frequency will not pass through metal barriers such as aluminum siding. If you have metal siding, align the remote and console through a window to get a clear line of sight.

4.7 Adjustment or Calibration

Note: The calibrated value can only be adjusted on the console. The remote sensor(s) always displays the un-calibrated or measured value.

Note: The measured humidity range is between 10 and 99%. Humidity cannot be accurately measured outside of this range. Thus, the humidity cannot be calibrated below 10% or above 99%.

The purpose of calibration is to fine tune or correct for any sensor error associated with the devices margin of error. The measurement can be adjusted from the console to calibrate to a known source.

Calibration is only useful if you have a known calibrated source you can compare it against, and is

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optional. This section discusses practices, procedures and sources for sensor calibration to reduce manufacturing and degradation errors. Do not compare your readings obtained from sources such as the internet, radio, television or newspapers. They are in a different location and typically update once per hour.

The purpose of your weather station is to measure conditions of your surroundings, which vary significantly from location to location.

4.7.1 Indoor Temperature and Humidity Calibration

Press and hold the **ADJUST and MIN/MAX** buttons at the same time for 5 seconds and the indoor temperature value will begin flashing. Press the **CHANNEL/+** button to increase the temperature and the **MIN/MAX/-** button to decrease the temperature reading in 0.1° increments. To rapidly increase (or decrease) the temperature reading, press and hold the **CHANNEL/+** or **MIN/MAX/-** button.

To return the temperature to the actual or uncalibrated measurement, press the **ADJUST** button.

Press and hold the **ADJUST and MIN/MAX** buttons at the same time for 5 seconds again, and the indoor humidity value will begin flashing. Press the **CHANNEL/+** button to increase the humidity and the **MIN/MAX/-** button to decrease the humidity reading in 1% increments. To rapidly increase (or decrease) the humidity reading, press and hold the **CHANNEL/+** or **MIN/MAX/-** button.

To return the humidity to the actual or uncalibrated measurement, press the **ADJUST** button.

Once the displayed temperature or humidity equals the calibrated source, press and hold the **ADJUST** button for three seconds, or wait 15 seconds for timeout, and the indoor temperature or humidity value will stop flashing.

Discussion: Humidity is a difficult parameter to measure electronically and drifts over time due to contamination. In addition, location has an adverse affect on humidity readings (installation over dirt vs. lawn for example).

Official stations recalibrate or replace humidity sensors on a yearly basis. Due to manufacturing tolerances, the humidity is accurate to ± 5%. To improve this accuracy, the indoor and outdoor humidity can be calibrated using an accurate source, such as a sling psychrometer:

http://www.ambientweather.com/mafaredspslp.html

or one step humidpak calibration kits (reference Section 8). You can also use common table salt, water and a plastic bag:

http://ambientweather.wikispaces.com/ws70

4.7.2 Outdoor Temperature and Humidity Calibration

Prior to entering the calibration mode, press the **CHANNEL/+** button to select the outdoor temperature and humidity you wish to adjust.

Press and hold the **ADJUST and CHANNEL/+** buttons at the same time for 5 seconds and the outdoor temperature value will begin flashing. Press the **CHANNEL/+** button to increase the temperature and the **MIN/MAX/-** button to decrease the temperature reading in 0.1° increments. To rapidly increase (or decrease) the temperature reading, press and hold the **CHANNEL/+** or **MIN/MAX/-** button.

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To return the temperature to the actual or uncalibrated measurement, press the **ADJUST** button.

Press and hold the **ADJUST and CHANNEL/+** buttons at the same time for 5 seconds again, and the outdoor humidity value will begin flashing. Press the **CHANNEL/+** button to increase the humidity and the **MIN/MAX/-** button to decrease the humidity reading in 1% increments. To rapidly increase (or decrease) the humidity reading, press and hold the **CHANNEL/+** or **MIN/MAX/-** button.

To return the humidity to the actual or uncalibrated measurement, press the **ADJUST** button.

Once the displayed temperature or humidity equals the calibrated source, press and hold the **ADJUST** button for three seconds, or wait 15 seconds for timeout, and the outdoor temperature or humidity value will stop flashing.

Discussion: Temperature errors can occur when a sensor is placed too close to a heat source (such as a building structure, the ground or trees).

To calibrate temperature, we recommend a mercury or red spirit (fluid) thermometer. Bi-metal (dial) and other digital thermometers are not a good source and have their own margin of error. Using a local weather station in your area is also a poor source due to changes in location, timing (airport weather stations are only updated once per hour) and possible calibration errors (many official weather stations are not properly installed and calibrated).

Place the sensor in a shaded, controlled environment next to the fluid thermometer, and allow the sensor to stabilize for 48 hours. Compare this temperature to the fluid thermometer and adjust the console to match the fluid thermometer.

5 Glossary of Terms

Term	Definition
Accuracy	Accuracy is defined as the ability of a measurement to match the actual value of the quantity being measured.
Hygrometer	A hygrometer is a device that measures relative humidity. Relative humidity is a term used to describe the amount or percentage of water vapor that exists in air.
Range	Range is defined as the amount or extent a value can be measured.

6 Specifications

6.1 Wireless Specifications

- Line of sight wireless transmission (in open air): 300 feet, 100 feet under most conditions.
- Frequency: 433 MHz
- Update Rate: 60 seconds

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6.2 Measurement Specifications

The following table provides specifications for the measured parameters.

Measurement	Range	Accuracy	Resolution
Indoor Temperature	32 to 140 °F	± 1 °F	0.1 °F
Outdoor Temperature	-40 to 140 °F	± 1 °F	0.1 °F
Indoor Humidity	10 to 99 %	± 5% (only guaranteed between 20 to 90%)	1 %
Outdoor Humidity	10 to 99%	± 5% (only guaranteed between 20 to 90%)	1 %

6.3 Power Consumption

- Base station (display console) : 4 x AAA 1.5V Alkaline or Lithium batteries (not included)
- Remote sensor : 2 x AAA 1.5V Alkaline or Lithium batteries (not included)
- Battery life: Minimum 12 months for base station with one sensor and excellent reception. Intermittent reception and multiple sensors may reduce the battery life.
  Minimum 12 months for thermometer-hygrometer sensor (use lithium batteries in cold weather climates less than -4 °F)

7 Troubleshooting Guide

If your question is not answered here, you can contact us as follows:

1. Email Support: support@ambientweather.com
2. Live Chat Support: www.ambientweather.com/chat.html (M-F 8am to 4pm Arizona Time)
3. Technical Support: 480-283-1644 (M-F 8am to 4pm Arizona Time)

Problem	Solution
Wireless remote (thermo-hygrometer) not reporting in to console. There are dashes (--.-) on the display console.	If any of the sensor communication is lost, dashes (--.-) will be displayed on the screen. To reacquire the signal, press and hold the **CHANNEL/+** button for 3 seconds, and the remote search icon will be constantly displayed. Once the signal is reacquired, the remote search icon will turn off, and the current values will be displayed. The maximum line of sight communication range is 300' and 100' under most conditions. Move the sensor assembly closer to the display console. If the sensor assembly is too close (less than 5'), move the sensor assembly away from the display console. Make sure the remote sensor LCD display is working and the transmitter light is flashing once per 60 seconds. Install a fresh set of batteries in the remote thermo-hygrometer. For cold weather environments, install lithium batteries.

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Problem	Solution
	Make sure the remote sensors are not transmitting through solid metal (acts as an RF shield), or earth barrier (down a hill). Move the display console around electrical noise generating devices, such as computers, TVs and other wireless transmitters or receivers. Move the remote sensor to a higher location. Move the remote sensor to a closer location.
Temperature sensor reads too high in the day time.	Make sure the thermo-hygrometer is mounted in a shaded area on the north facing wall. Consider the following radiation shield if this is not possible: http://www.ambientweather.com/amwesrpatean.html
Indoor and Outdoor Temperature do not agree	Allow up to one hour for the sensors to stabilize due to signal filtering. The indoor and outdoor temperature sensors should agree within 2 °F (the sensor accuracy is ± 1 °F). Use the calibration feature to match the indoor and outdoor temperature to a known source.
Indoor and Outdoor Humidity do not agree	Allow up to one hour for the sensors to stabilize due to signal filtering. The indoor and outdoor humidity sensors should agree within 10 % (the sensor accuracy is ± 5 %). Use the calibration feature to match the indoor and outdoor humidity to a known source.
Display console contrast is weak	Replace console batteries with a fresh set of batteries.

8 Accessories

The following software and hardware accessories are available for this weather station at www.AmbientWeather.com .

Accessory		Description
Ambient Weather F007TH Wireless Thermo-Hygrometer		Add additional remote thermo-hygrometers. Supports up to eight remote sensors.

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Accessory		Description
Ambient Weather F007PF 8-Channel Wireless Pool and Spa Remote Sensor		Add additional pool and spa thermometers. Supports up to eight remote sensors.
Ambient Weather F007TP 8-Channel Wireless Thermometer with Dry Temperature Probe		The remote sensor includes a water proof probe for measuring any dry temperature medium, including and refrigerators, freezers.

9 Liability Disclaimer

Please help in the preservation of the environment and return used batteries to an authorized depot. The electrical and electronic wastes contain hazardous substances. Disposal of electronic waste in wild country and/or in unauthorized grounds strongly damages the environment.

Reading the "User manual" is highly recommended. The manufacturer and supplier cannot accept any responsibility for any incorrect readings and any consequences that occur should an inaccurate reading take place.

This product is designed for use in the home only as indication of weather conditions. This product is not to be used for medical purposes or for public information.

The specifications of this product may change without prior notice.

This product is not a toy. Keep out of the reach of children.

No part of this manual may be reproduced without written authorization of the manufacturer.

Ambient, LLC WILL NOT ASSUME LIABILITY FOR INCIDENTAL, CONSEQUENTIAL, PUNITIVE, OR OTHER SIMILAR DAMAGES ASSOCIATED WITH THE OPERATION OR MALFUNCTION OF THIS PRODUCT.

10 FCC Statement

Statement according to FCC part 15.19:
This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.

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2. This device must accept any interference received, including interference that may cause undesired operation.

Statement according to FCC part 15.21:
Modifications not expressly approved by this company could void the user's authority to operate the equipment.
Statement according to FCC part 15.105:
NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.
However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

11 Warranty Information

Ambient, LLC provides a 1-year limited warranty on this product against manufacturing defects in materials and workmanship.

This limited warranty begins on the original date of purchase, is valid only on products purchased and only to the original purchaser of this product. To receive warranty service, the purchaser must contact Ambient, LLC for problem determination and service procedures.

Warranty service can only be performed by a Ambient, LLC. The original dated bill of sale must be presented upon request as proof of purchase to Ambient, LLC.

Your Ambient, LLC warranty covers all defects in material and workmanship with the following specified exceptions: (1) damage caused by accident, unreasonable use or neglect (lack of reasonable and necessary maintenance); (2) damage resulting from failure to follow instructions contained in your owner’s manual; (3) damage resulting from the performance of repairs or alterations by someone other than an authorized Ambient, LLC authorized service center; (4) units used for other than home use (5) applications and uses that this product was not intended (6) the products inability to receive a signal due to any source of interference or metal obstructions and (7) extreme acts of nature, such as lightning strikes or floods.

This warranty covers only actual defects within the product itself, and does not cover the cost of installation or removal from a fixed installation, normal set-up or adjustments, claims based on misrepresentation by the seller or performance variations resulting from installation-related circumstances.

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